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Design and Development of Drill Powered Saw

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ABSTRACT: "The drill powered saw" as a project work, it has helped us to understand the wood cut working, by all of the view like about its working capacity, the product which will it produce, what will be the difficulties in working of the machine, kind of safe working, working reliability, number of operations that can be performed with this machine. Both drilling and cutting operations can be done in a single machine.
The Scotch Yoke mechanism converts the rotary motion into the reciprocating motion. This concepts is used to convert the rotary motion of the motor to the reciprocating motion of the jigsaw blades.
Keywords; Multi-Way Hacksaw, Scotch **Yoke Mechanism, Hacksaw Machine, etc.**

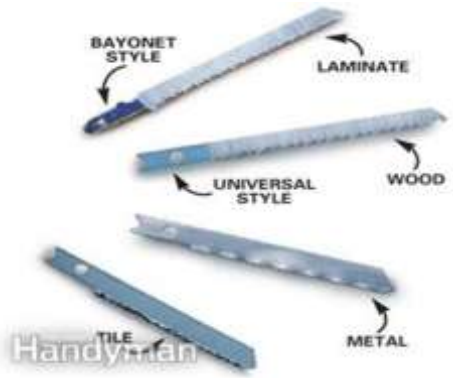
I. INTRODUCTION

This attachment is connected to a driller which converts the rotory motion of the driller to a to and fro motion,the driller which run with help of current. This mechanism used here is skotchyoke mechanism. We can perform the cutting operations with the help of this attachment in the same driller itself.

JIGSAW BLADES

A Jigsaw works by attaching a blade accessory to the tool. There are various Blades types of blades in the market. Most jigsaws require a blade to be screwed into the tool, but Bosch has since added the first tool less blade change system allowing a blade to be snapped into the tool. There are T-shank blades and U-shank blades available in the accessory market. T-Shank blades are the industry-standard professional interface that provides a longer life and a tighter fit from the blade to the tool. Tooth design is important for the performance of a blade. The tooth spacing, tooth shape, and cutting angle are important in providing speed, cleanliness of cuts, and optimal performance. A side set and ground tooth is designed for clean and fast cuts in wood and plastics.

- **High-carbon steel (HCS)-** is used for softer materials such as wood, laminated particle board, and plastics due to its flexibility.
- **High-speed steel (HSS)-** is a stronger steel that can cut all types of metals.
- **Bi-Metal (BIM)-** blades contain a combination of high-carbon steel and highspeed steel.
- **Diamond-grit blades**- are extremely versatile, as they can cut rough materials such as hard porcelain tile, granite, slate, marble, and other stones.



WORKING PRINCIPLE

It works on the principle of skotch yoke mechanism. The mechanism whicgh converts rotory motion to oscillatory or reciprocating motion.here the motion is converted by fixing a bearing on a shaft at an angle 45 degree with the shaft.

A spindle bar with two pins are placed above the bearing which slides over the supporting plates. So the rotatory motion is converted into oscillatory motion.

Materials used:

- Iron plates - Mild steel plate
  4mm thick
  2mm thick
- Square bar – 15 x 15 mm
- Bearing – deep grooved ball bearing

40mm diameter(6203ZZ) -1
25mm diameter(SFK6201)-2

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- Screws-pan head type(3.1mm) -5
- Jig saw blade
- Machining device
- Welding machine
- Drilling machine
- Grinding machine
- M seal
- Paint
- Other hand tools like files, punches, measuring instruments etc.

II. LITERATURE REVIEW

The problem of cutting-off material to size is common to practically every industry. Often, sawing is the first operation carried out on bar stock. Therefore, it is surprising that so little work has been done to understand the problems of this common operation. Many reasons have been given for this such as lack of interest, it is a routine operation and that there is no need to consider better methods. Often the foreman will assign a new trainee to a sawing task, on the principle that it is easy to learn and difficult to foul up.

Furthermore cut-off machines are frequently housed in stores away from the main production areas and the operation of the sawing machines appears to be simple. The fact remains that cutting-off operations can account for a significant part of the cost per piece (Remmerswaa and Mathysen, 1961). The reason for carrying out the present work is the growing realization on the part of manufacturers of both blades and machines, that the factors which control the mechanics and economics of power hacksawing are complex.

Thus, both manufacturers of jigsaw blades and users have experienced considerable difficulty in establishing standard testing procedures and in obtaining consistency in test data using powermachines.

Preliminary investigations by the author have revealed that existing blade testing methods were not independent of the machine characteristics, which could contribute to one of the reasons for the inconsistency in the test data. Hence, there has been requirement to identify the machine characteristics under normal working conditions and to investigate the mechanics of the sawing process and the variables affecting metal removal rate.

Most of the early published work on cutting-off has been primarily concerned with circular and band sawing and cost comparisons between alternative processes. Whilst these alternative processes are frequently, quicker than power sawing, their costs are in many applications higher. Whilst the impact of these alternative processes on the application of power sawing cannot be denied there remains a significant field of application for power sawing which is likely to remain unchallenged. A factor of prime interest to manufacturers is that, if the costs of power sawing can be reduced by developing the blade and the saw machine, the potential field of application will be widened.

During the past fifty years very little attention has been devoted to developing the geometry of the jigsaw blade or the machine, although, some improvements in the blade material, together with methods of applying the load and mechanized work handling, have been achieved (Nelson,1965).

Prof. Nitinchandra R. Patel, Ravi Thakkar, Miteshkumar Rathwa in his research paper - Material selection and testing of saw blade based on mechanical properties‖ stated that the appropriate saw blade must be selected for better operation and fine cutting by selecting number of teeth per inch.

H G Chothani, (2015) explained, in Mechanical Workshop/Technical institute, designer always faces the difficulties to select the perfect hack saw blade material for use of trainee as well as students to avoid accidents and reduce failure rates of blade.

SYSTEM ARCHITECTURE

Collect all the materials as per the sketch or diagram we made. Cut the materials into actual dimensions using grinder. Weld the cutted plates as shown in the sketch. Use angle plates to align the plates straight and accurate.

After welding the plates and bearings grind the welded parts (to remove slag) with using files or angle grinders finish the surface and the screw the top most part. The top part is covered because it acts as a protective surface. No need for welding that part. Then paint the whole surface with enamel paint and also need to apply lubricants to the spindle and all the moving parts.

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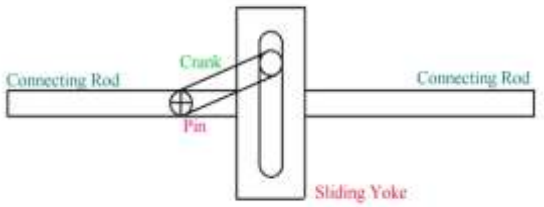
BEARINGS

The bearings are pressed smoothly to fit into the shafts because if hammered the bearing may develop cracks. Bearing is made up of steel material.

SCOTCH YOKE MECHANISM

The Scotch Yoke (also known as slotted link mechanism) is a reciprocating motion mechanism, converting the linear motion of a slider into rotational motion, or vice versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part.



APPLICATIONS

- They can be used for cutting wood,plywood,MDF,HDF woods in different direction, so we can cut different shapes
- Metal cutting
- Cutting metal rods
- Cutting metal surfaces where other cutting machines are not accessible

III. CONCLUSION

A strong multi-discipline team with a good engineering base is necessary for the Development and refinement of advanced computer programming, editing techniques, diagnostic Software, algorithms for the dynamic exchange of informational different levels of manufacturing work.

This machine fits on all drilling machine and it replace the use of jigsaw (sawing machine). So it is economical and it reduces the machining costs. A jigsaw machine costs around 4500-12000Rs per piece. So this simple compact machine saves the initial purchase cost and we can do all the jobs or process a jigsaw do.The jobs like metal cutting in all direction etc .So the mechine is economical,user friendly, money saving.By using more techniques, they can be modified and developed according to the applications.

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.

We are proud that we have completed the work with the limited time successfully. The **"DRILL POWERED SAW"** is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities.

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